LOOKOUT

MARINE VISUAL SIMULATION

✳ **REDIFFUSION**
Simulation

A new era of marine simulation

Today marine simulation has moved into a new era with the development of Rediffusion Simulation's new Lookout image generation and projected display systems.

At a stroke Lookout has shifted the emphasis in maritime training away from simulators limited in scope to simply radar and other electronic navigational aids.

Training requirements differ but, for the first time in a cost effective format, a fully integrated marine visual simulation system is available.

As a result, students may now be presented with accurate, real world scenes from the windows of a ships bridge simulator. The system is based on Rediffusion's Computer Generated Image technology, which in the air transport industry, has captured more than 90% of the available world

market. Scenes may be generated under night, dusk or daylight conditions and visibility levels selected to cover most training scenarios.

Advanced computer modelling techniques allow actual ports, coastlines, and docking facilities to be reproduced with a very high degree of accuracy.

However, for marine applications the major breakthrough has been in the technology of scene projection. Rediffusion's revolutionary multi-screen CGI calligraphic projection system has made it possible to combine previously unattainable levels of picture resolution with continous wide-angle fields of view.

There are three Lookout image generating systems providing progressive levels of scene content and designed to meet a very wide range of

training demands.

Each system may be organised to display at least five channels simultaneously.

The image generating technology on which Lookout is based has been well proven on the world's most advanced flight simulators. This Rediffusion B727 simulator features four window full daylight visual displays.

Data base development is carried out at Rediffusion's Arlington, Texas facility.
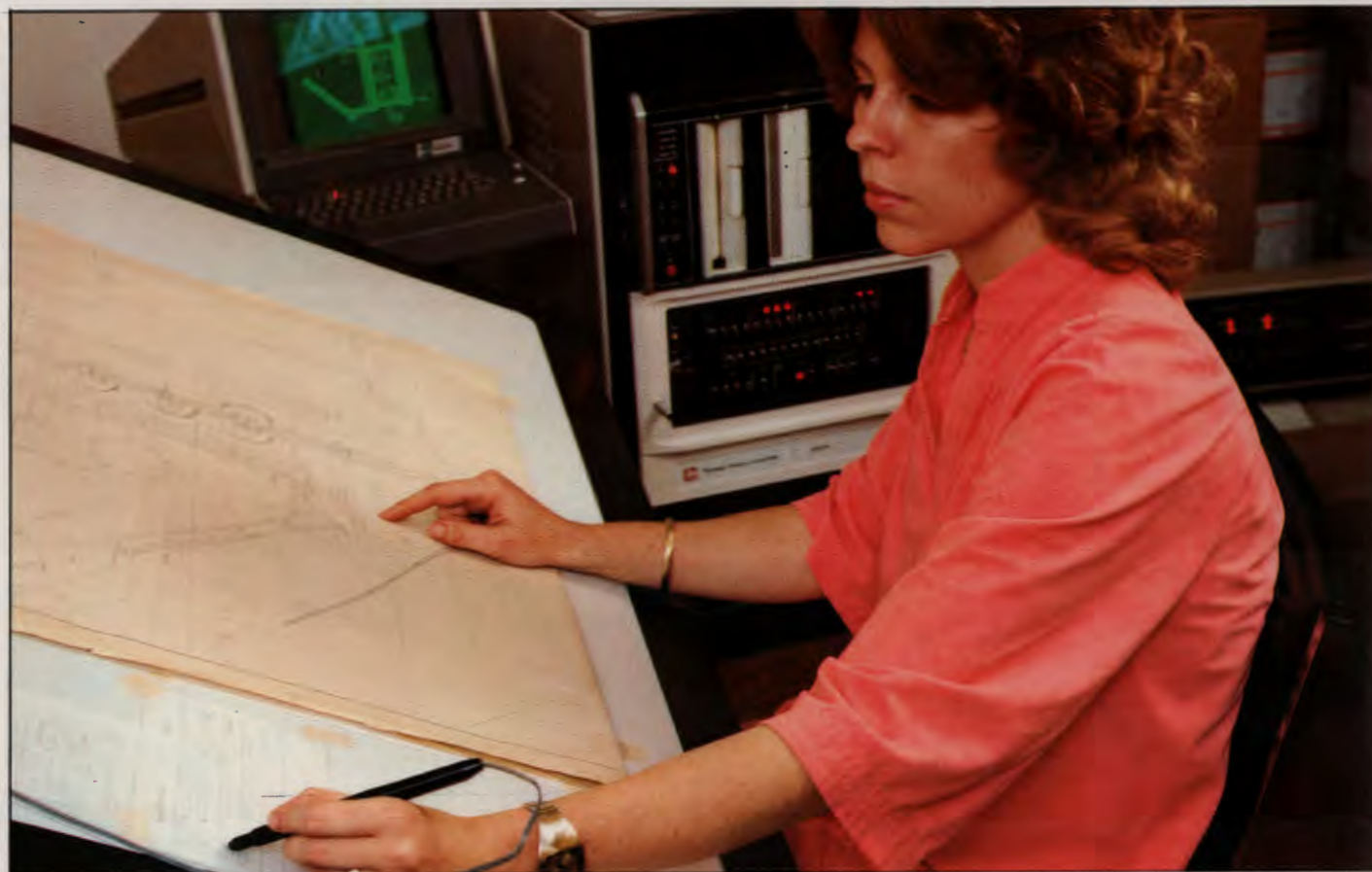
Scene generation

Lookout 1

is designed to provide high quality night and dusk scenes using a beam penetration cathode ray tube or calligraphic projector. With 6000 lights in five colours – red, orange, green, amber, yellow/white, and over 200 surfaces in 64 shades of grey, this relatively low cost system meets many of today's marine visual training requirements.
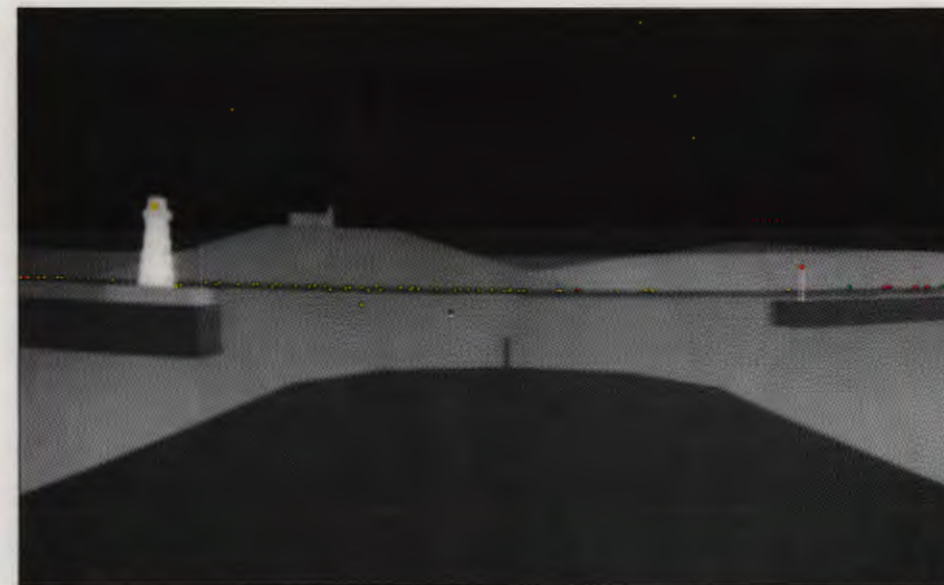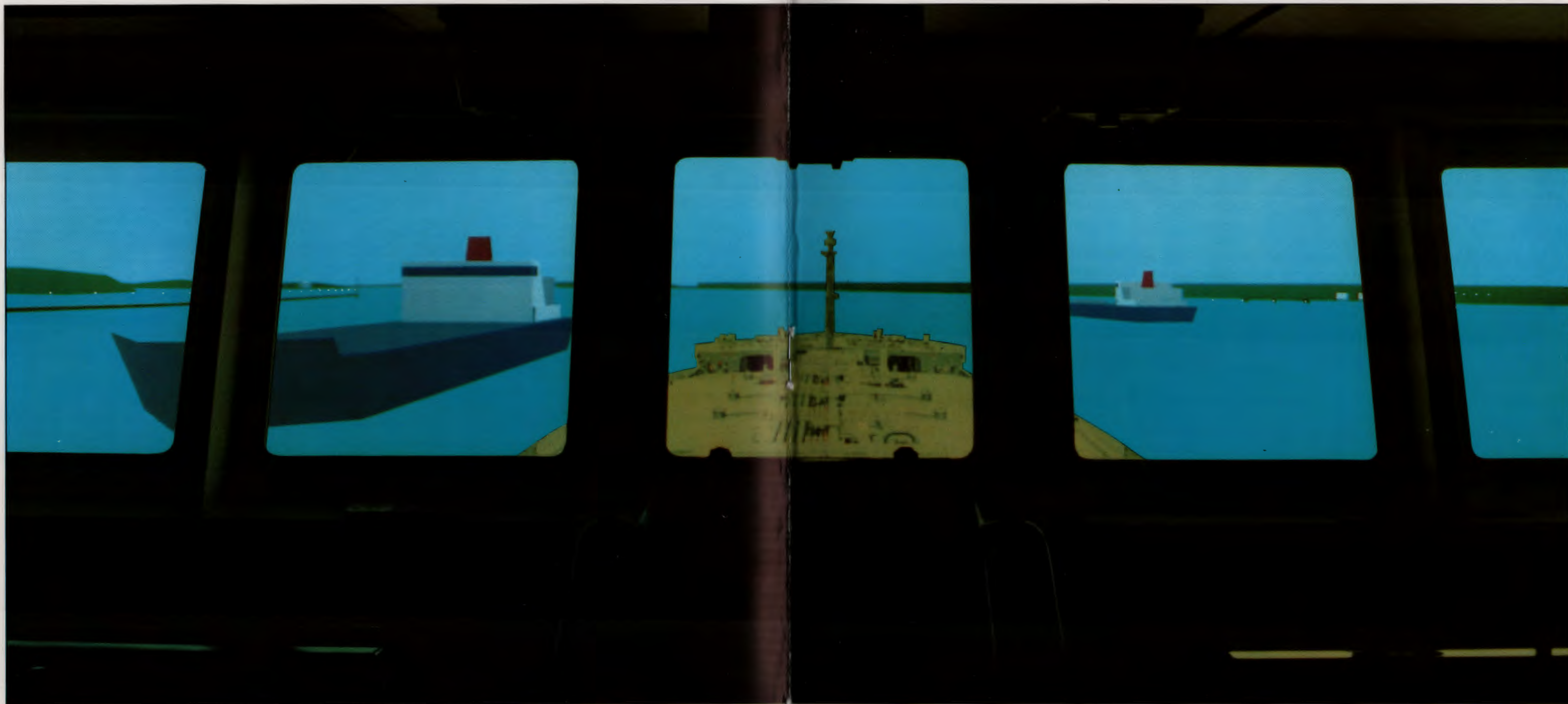

Lookout 2

utilises a high resolution shadow mask cathode ray tube or calligraphic projector which enables colour scenes to be displayed in night, dusk, and daylight conditions. Up to approximately 400 surfaces in 128 combinations of red, blue and green can be displayed, whilst eight colours (including blue) can be allocated to the 2000 lights available. A trade off between light points and surface capability allows model capacity to be organised in line with specific customer requirements.

Lookout 3

is a full colour system that results from a continuous development programme representing the latest state-of-the-art in computer generated visual techniques. Up to 2,500 surfaces in 256 smooth colour shading combinations can be displayed. This allows high levels of scene content to be displayed in daylight conditions.

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Lookout 2 provides detailed scenes from the ships bridge under daylight, dusk and night conditions. Intelligent modelling and data base management cope with the detail required for coastal passage and collision avoidance, whilst, for more complex berthing or inner harbour exercises, computer capacity may be concentrated into a smaller area.

Under night and dusk conditions, contours of background land and buildings are supplemented with lights representing navigational features and shore lighting. Other moving ships and a generalised star background complete the picture. Scenes above and left are generated on Lookout 2 day/dusk/night system, and right on Lookout 1 night/dusk system.

Scene projection

Under certain conditions monitor display of the computer generated scene may well satisfy a limited training requirement. However, where a training programme demands the full environmental realism of a ships bridge, a large scale projection of the scene is essential.

To meet this requirement Rediffusion Simulation has carried out intensive research and development into projection techniques specifically for application in the field of marine simulation. As a result, a unique advanced technology projection system capable of displaying high resolution calligraphic computer generated images is now available. The projector is also capable of displaying conventional television raster based pictures and thus can be used in association with the highly advanced Lookout 3 system.

Wide horizontal fields of view are achieved by the use of multiple projectors, the configuration being determined by the requirements of bridge size and scene resolution. Typically, however, a five channel system can achieve a continuous field of view up to 240° without jeopardising scene quality.

Rediffusion Simulation will be pleased to advise on the optimum configuration to meet a customer's specific training requirement, which may in some cases include systems of more than the standard five channels.

Back projection of the scene is normally recommended, but where space becomes a limiting factor, front projection of up to three channels can be considered.

Maintainability is a significant design feature of Lookout visuals.

The relationship between horizontal field of view and effective viewing area using various projector combinations.

Optimum viewpoint from the screen is dictated by the horizontal field of view per channel. Moving the viewpoint closer to the screen to increase the field of view will result in an unacceptable loss in terms of visual perception (B) whilst moving further away requires additional channels for a given overall field of view (C).

Standard Lookout projection systems use a 48° horizontal (34° vertical) FOV/channel which enables a maximum 240° to be displayed with one image generator.

System configuration

Lookout systems can be offered in their own right, integrated with existing bridge/radar simulators, or incorporated into bridge/radar simulators offered by other manufacturers.

The Lookout image generating computer receives ships dynamic information from the simulator's host computer.

More than 200 Rediffusion Simulation CGI visual systems have been sold to the aviation industry, representing 53 customers in 27 countries. Furthermore, these systems have already been integrated with 24 different types of host computer.

Specifically in the marine field, the Company has designed and manufactured a variety of equipments from ship's machinery control rooms to nuclear powered submarine simulators.

This wealth of experience has now been extended to meet the visual training requirements of the Marine Industry.
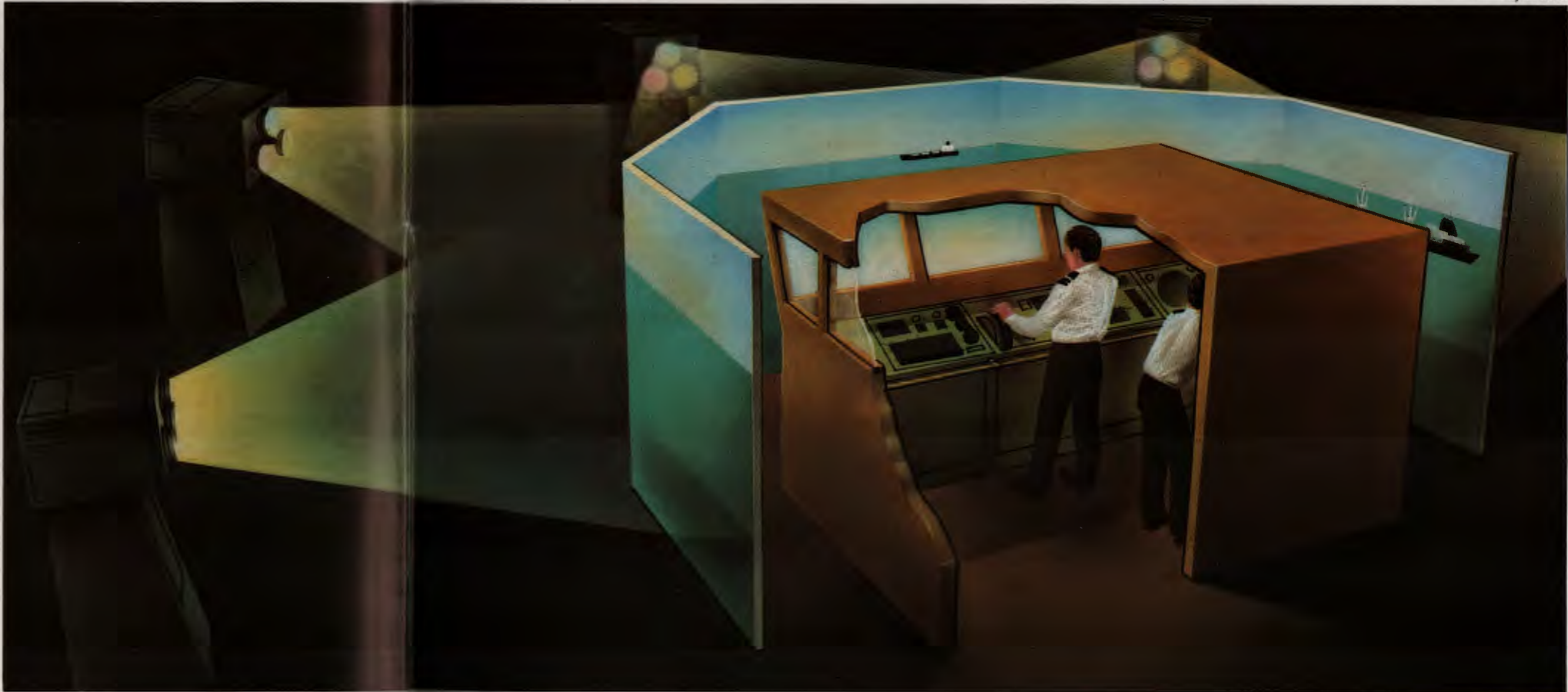
LOOKOUT — SYSTEMS SUMMARY

Lookout 1

Environment	Night/dusk	Dynamic targets	Up to 3
Display channels	1 – 5	Field rate	30 Hz
Lights	6000		
Edges	256	Displays	25'' beam penetration monitor or high resolution calligraphic projector
Surfaces (approx)	200		
Colours: Lights	5 – red, orange, amber, green, yellow/white		
Surfaces	64 grey shades	Special features	Variable visibility

Lookout 2

Environment	Night/dusk/day	Dynamic targets	Up to 6
Display channels	1 – 5	Field rate	30 Hz (40 Hz day)
Lights	2000 (500 day)		
Edges	512	Displays	25'' calligraphic shadow mask monitor or high resolution calligraphic projector
Surfaces (approx)	400		
Colours: Lights	8 – red, orange, amber, blue/ white, white, pale/ green, green, blue		
Surfaces	128 combinations of red, green and blue	Special features	Variable visibility Database management

Lookout 3

Environment	Night/dusk/day	Dynamic targets	Depends on surface/light content
Display channels	1 – 6		
Lights	4000		
Edges		Field rate	50 Hz
Surfaces (approx)	2500	Displays	700/1000 line TV raster monitor or projector
Colours: Lights	256 combinations of red, green and blue		
Surfaces	256 combinations of red, green and blue	Special features	Variable visibility Database management Smooth shading

An artist's impression of a basic multi-channel Lookout system.

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